

10/01/99
JCS94 U.S. PTO

REV. 11/98
For Other Than A Small Entity

A

Docket No. UV-111

Applicants : Edward B. Knudson et al.

For : PROGRAM GUIDE SYSTEM WITH COMBINATION
CATEGORY SEARCH

EXPRESS MAIL CERTIFICATION

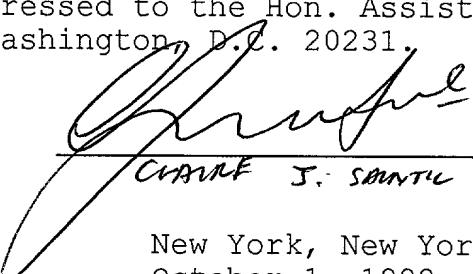
"Express Mail" mailing label number EH623264894US.

Date of Deposit October 1, 1999.

JCS94 U.S. PRO
09/410332
10/01/99

I hereby certify that this transmittal letter and the other papers and fees identified in this transmittal letter as being transmitted herewith are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on the date indicated above and are addressed to the Hon. Assistant Commissioner for Patents, Washington, D.C. 20231.

Hon. Assistant Commissioner
for Patents
Washington, D.C. 20231


Charles J. Sante
New York, New York

October 1, 1999

TRANSMITTAL LETTER FOR
ORIGINAL PATENT APPLICATION

Sir:

Transmitted herewith for filing are the [X] specification; [X] claims; [X] abstract; [X] declaration and [X] power of attorney, for the above-identified patent application.

Also transmitted herewith are:

[X] 13 sheets of:

[] Formal drawings.

[X] Informal drawings. Formal drawings will be filed during the pendency of this application.

09410332-1001.99

Certified copy(ies) of application(s)

(country)	(appln. no.)	(filed)
(country)	(appln. no.)	(filed)
(country)	(appln. no.)	(filed)

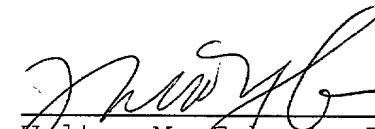
from which priority is claimed.

- An assignment of the invention to United Video Properties, Inc.
- A check in the amount of \$40.00 to cover the recording fee.
- Please charge \$40.00 to Deposit Account No. 06-1075 in payment of the recording fee. A duplicate copy of this transmittal letter is transmitted herewith.
- An associate power of attorney.

The filing fee has been calculated as shown below:

FOR	NUMBER FILED	NUMBER EXTRA	RATE	FEE
BASIC FEE				\$ 760.00
TOTAL CLAIMS	61	- 20 = 41	X \$ 18 =	\$ 738.00
INDEPENDENT CLAIMS	3	- 3 = 0	X \$ 78 =	\$
[] MULTIPLE DEPENDENT CLAIMS			+ \$260 =	\$
			TOTAL	<u>\$1498.00</u>

- SEARCHED INDEXED
SERIALIZED FILED
- [X] A check in the amount of \$1498.00 in payment of the filing fee is transmitted herewith.
- [] This application is being filed unaccompanied by a filing fee. The appropriate filing fee will be paid in response to a Notice to File Missing Parts, pursuant to 37 C.F.R. § 1.53(d).
- [X] The Commissioner is hereby authorized to charge payment of any additional filing fees required under 37 C.F.R. § 1.16, in connection with the paper(s) transmitted herewith, or credit any overpayment of same, to deposit Account No. 06-1075. A duplicate copy of this transmittal letter is transmitted herewith.
- [] Amend the specification by inserting before the first line the sentence: -- This is a [] continuation-in-part, of application Serial No.: _____, filed _____ entitled _____
- [] Please charge \$_____ to Deposit Account No. 06-1075 in payment of the filing fee. A duplicate copy of this transmittal letter is transmitted herewith.



Walter M. Egbert, III
Registration No. 37,317
Attorney for Applicants
FISH & NEAVE
1251 Avenue of the Americas
New York, New York 10020-1104
Tel.: (212) 596-9000

PROGRAM GUIDE SYSTEM WITH
COMBINATION CATEGORY SEARCH

This application claims the benefit of
United States provisional application Serial No.
5 60/106,855, filed November 3, 1998.

Background of the Invention

This invention relates to interactive television program guides, and more particularly, to television program guides that provide programming categories or themes that are combinations of individual categories, and in which users may select particular subsets of programming by category or theme.

Cable, satellites, and broadcast television systems provide users with a large number of television channels. Users have traditionally consulted printed television program schedules to determine the programs being broadcast at a particular time. More recently, interactive electronic television program guides have been developed that allow television program information to be displayed on a user's television.

Interactive program guides are typically implemented on set-top boxes. Such program guides allow users to view television program listings in

different display formats. For example, a user may instruct the program guide to display a grid or table of program listings organized in a channel-ordered or a time-ordered list. Users may also search and sort 5 program listings by category (e.g., movies, sports, etc.) or by title (i.e., alphabetically).

Because there are so many television channels available, particularly with cable and satellite television systems, television program guides have been 10 developed that allow users to select favorite channels. During tuning, the program guide may allow the user to tune to favorite channels only, while skipping all other channels. Alternatively, a display screen containing program listings may be organized in a way 15 that reflects which channels are favorites. For example, a table of program listings may contain only favorite channels and all other channels may be suppressed from view. According to another approach, program listings for all channels are displayed.

20 However, when the user scans through the table of program listings, the cursor control, which highlights a program and allows the user to make a selection, will advance among the favorite channels and skip over the other channels.

25 Another approach for assisting the user in selecting among the television channels available is to allow users to search for program listings in categories (sometimes referred to as genres or themes). With this approach the user cannot narrow the search 30 beyond that of the standard categories (e.g., sports, comedies, etc.).

Other program guides allow the user to perform searches based on multiple categories, but this requires that the user select each category and then initiate the search, which may be a cumbersome process.

5 Some program guides address this abundance of information by having hierarchical categories. First, the user is presented with a relatively short list of higher-level or more general categories. Typical higher-level categories include movies, sports, or
10 series programs. After the user selects a higher-level category, the program guide displays a list of subcategories, such as comedy, action, or baseball, from which the user may select one or more subcategories. This process may continue through
15 several levels of subcategorization. While the list of categories at each level may be relatively short and easier to view and comprehend, a drawback is that the user may not readily appreciate which high-level category will lead to a desired specific category at a
20 lower level. The user may be required to enter multiple keystrokes to find the desired category.

After tediously setting up a multiple category search or navigating a complex hierarchical menu, the user may eventually locate a desired category
25 only to discover that there are no program listings for that category. Moreover, the user must repeat this process whenever searching for program listings involving a new category.

What is needed is a more sophisticated way in
30 which a program guide can handle programming categories.

It is therefore an object of the present invention to provide an interactive television program guide system in which more specific programming categories may be generated.

- 5 It is also an object of the invention to provide program listings that may be displayed and searched according to programming categories that are more reflective of a user's interests.

Summary of the Invention

- 10 These and other objects of the invention are accomplished in accordance with the principles of the present invention by providing an interactive television program guide system in which an interactive television program guide is at least partially
- 15 implemented on user equipment. The program guide may be partially implemented at a server located, for example, at a television distribution facility and partially implemented on user television equipment or on user personal computer equipment.
- 20 The program guide displays program listings for a user on the user equipment. Each program listing may be associated with a plurality of programming categories. For example, a program listing may be associated with three categories. The categories
- 25 associated with the program listing are independent in that the user need only perform a single-level search on any of the three categories to retrieve the associated program listing. The categories may be simple categories or combination categories.
- 30 Combination categories are composed of multiple simple categories. Examples of simple categories are movies,

comedy, sports and series. Examples of combination categories are comedy-movies, comedy-series, and sports-baseball. Not all combinations of categories need to be supported. For example, the program guide 5 may support the combination category horror-movies but not horror-series. The combination categories that are supported are preferably those that allow users to readily access desirable groups of program listings.

The program guide may display the categories 10 that are available in a list from which a user may select a desired category. The list may include both simple categories and combination categories. The simple categories and the combination categories may be intermixed. When the user selects a given category 15 from the list, the program guide displays all program listings for that category.

The categories in the list may be displayed 20 in a predefined initial order. For example, the categories may be listed in alphabetical order. All categories of a particular type may be grouped together. For example, all movie categories may be grouped together or all sports categories may be grouped together.

The program guide may allow the user to 25 modify the list of categories to make it easier to locate the user's favorite categories. For example, each time a category is accessed it may be moved to the top of the list. Categories may also be moved to the top of the list based on how often they are accessed. 30 The program guide may allow the user to change the order of the categories in the list directly by specifying a category to move to the top or bottom of

the list or by otherwise rearranging the order of the categories. The program guide may also allow the user to remove a category from the list. The program guide may provide the user with an opportunity to add removed 5 categories back to the list at a later time.

Further features of the invention, its nature and various advantages will be more apparent from the accompanying drawings and the following detailed description of the preferred embodiments.

10 Brief Description of the Drawings

FIG. 1 is a diagram of an interactive television program guide system.

15 FIG. 2 is a flow chart of steps involved in assigning categories to program listings, allowing the user to select a given category, and display a corresponding set of matching program listings in accordance with the present invention.

FIG. 3(a) is illustrative program listings data in accordance with the present invention.

20 FIG. 3(b) is a partial listing of exemplary combination categories supported by the program guide in accordance with the present invention.

25 FIG. 3(c) is illustrative program listings data similar to that shown in FIG. 3(a), but modified following a combination category build process in accordance with the present invention.

FIG. 4 is an illustrative interactive program guide display screen for displaying and selecting categories in accordance with the present invention.

30 FIG. 5(a) is a flow chart of steps involved in providing options for selecting display

configurations in accordance with the present invention.

FIG. 5(b) is an illustrative interactive program guide display screen for displaying and
5 selecting categories in accordance with the present invention.

FIG. 5(c) is an illustrative interactive program guide display screen similar to FIG. 5(b), illustrating the redisplay of the categories after the
10 selection of FIG. 5(b) in accordance with the present invention.

FIG. 6 is a flow chart of steps involved in providing options for selecting display configurations in accordance with an alternative embodiment of the
15 present invention.

FIG. 7(a) is a flow chart of steps involved in providing options for selecting display configurations in accordance with a second alternative embodiment of the present invention.

20 FIG. 7(b) is an illustrative interactive program guide display screen for displaying and selecting categories in accordance with the present invention.

FIG. 8 is a flow chart of steps involved in providing options for selecting display configurations in accordance with a third alternative embodiment of
25 the present invention.

FIG. 9 is an illustrative program display screen containing program listings that match a
30 selected category in accordance with the present invention.

2010 RELEASE UNDER E.O. 14176

FIG. 10 is an illustrative program guide display screen in which the program listings that match a selected category have been distinctively displayed in accordance with the present invention.

5 FIG. 11 shows an illustrative program listings by category screen in accordance with the invention.

10 FIG. 12 shows an illustrative interactive program guide display screen for providing information and user-selectable options with respect to program 15 listings, in accordance with the invention.

Detailed Description of the Preferred Embodiments

An illustrative interactive television program guide system 10 in accordance with the present 15 invention is shown in FIG. 1. Main facility 12 may contain a back office processor 14 for organizing data, such as television program guide listings data, as will be described in greater detail below. Main facility 12 may also contain a program guide database 16 for 20 storing program guide information, pay-per-view ordering information, television program promotional information, etc. Some of the information stored in database 16 may be from an external data source 18. Back office processor 14 is used to process the 25 information stored in database 16.

Information from database 16 may be transmitted to multiple television distribution facilities such as television distribution facility 20 via communications links such as communications link 30 21. Only one television distribution facility is shown in FIG. 1 to avoid over-complicating the drawings.

Each Link 21 may be a satellite link, a telephone network link, a cable or fiber optic link, a microwave link, a combination of such links, or any other suitable communications path. If it is desired to

5 transmit video signals over link 21 in addition to data signals, a relatively high bandwidth link such as a satellite link is generally preferable to a relatively low bandwidth link such as a telephone line.

Television distribution facility 20 is a

10 facility for distributing television signals to users. Television distribution facility 20 may be, for example, a cable system headend, a broadcast distribution facility, a satellite television distribution facility, or any other suitable

15 distribution facility.

The program guide information transmitted by main facility 12 to television distribution facility 20 includes television program listings data for current and future television programs. The television program

20 listings data for each program preferably includes numerous program characteristics, e.g., the title of the program, the channel for the program, a scheduled broadcast time (start time) and an ending time (or duration). Other typical program characteristics

25 include ratings, critics' ratings, descriptions, categories (sports, movies, comedy, children, etc.), actors, etc. Transmitted program information may also include advertising information and pay program data such as pricing information for individual programs and

30 subscription channels, time windows for ordering programs and channels, telephone numbers for placing orders that cannot be impulse ordered, etc.

Television distribution facility 20 distributes television programming and program guide information to the user television equipment 26 or the user personal computer (PC) equipment 28 of multiple 5 users via communications paths 30 and 32, respectively. PC equipment 28 is based on a central processing unit (CPU) 44 and may have a monitor 46 and keyboard 48. User television equipment 26 may be based on a set-top box 34 and may have optional videocassette recorder 38, 10 or any other suitable recording device, such as a digital storage device (e.g., recordable DVD or hard disk) or a server located at a central location, a television 40, and remote control 42.

Various techniques may be used to distribute 15 television programming and program guide information. For example, television programming may be distributed over analog television channels and program guide data may be distributed over an out-of-band channel on paths 30. Data distribution may also involve using one or 20 more digital channels on paths 30 and 32. Such digital channels may also be used for distributing television programming and other information. Multiple television and audio channels (analog, digital, or both analog and digital) may be provided to set-top boxes 34 and PC 25 equipment 28 via communications paths 30 and 32. In user television equipment 26, television programs may be tuned to user's set-top box 34 and may be displayed by television 40. In user PC equipment 28, a video board or other such component may be used to tune to a 30 television program, and the television program may be displayed on monitor 46. Program listings and other information may be distributed via communications paths

32 to PC equipment 28, which may have a cable modem or other such communications device for receiving or transmitting data. In addition, program listings and other data may be distributed by one or more
5 distribution facilities that are similar to but separate from television distribution facility 20 using communications paths that are separate from communications paths 30 and 32. If desired, data from the main facility 12 may be distributed to PC equipment
10 28 over the Internet or other suitable communications path that does not involve the use of television distribution facility 20. In some configurations, program guide functions are provided in the form of an on-line program guide by using PC equipment 28 to
15 access a web server such as web server 29 over the Internet 31 or other such data network.

The program guide system may use a client-server architecture whether or not the system involves use of the Internet. In a client-server arrangement,
20 the program guide is partially implemented on a server and partially implemented on a client. The server may be a server such as server 22 located at, for example, television distribution facility 20. Processors in the user equipment, such as set top box 34 or CPU 44, may
25 act as the client processors. Program guide data that are distributed to a client-server program guide at television distribution facility 20 may be stored in a database 24 at television distribution facility 20 that is maintained by server 22. For clarity, the present
30 invention is described primarily in the context of an interactive television program guide that is implemented on user equipment using a set-top box 34 or

CPU 44 that receives data from television distribution facility 20, rather than in the context of program guides that are implemented using an on-line program guide configuration, are implemented partially on a 5 server and partially on user equipment, or are implemented using any other such arrangements.

Certain functions such as pay program purchasing may require set-top boxes 34 to transmit data to television distribution facility 20 over 10 communications paths 30. If desired, such data may be transmitted over telephone lines or other separate communications paths. If functions such as these are provided using facilities separate from television distribution facility 20, some of the communications 15 involving set-top boxes 34 may be made directly with the separate facilities.

User television equipment 26 has a receiver, which is typically a set-top box such as set-top box 34, but which may be other suitable television 20 equipment into which circuitry similar to set-top-box circuitry has been integrated. For example, user television equipment 26 may be based on an advanced television receiver such as a high definition television (HDTV) receiver. Program guide data may be 25 distributed to set-top boxes 34 periodically or continuously and stored in database 36. In a client-server architecture, this entire database need not be maintained on the set-top box. For example, the program guide may maintain a database such as database 30 24 using a server such as server 22 located at television distribution facility 20 or at some other appropriate location or locations. Television

distribution facility 20 may poll set-top boxes 34 periodically for certain information (e.g., pay program account information or information regarding programs that have been purchased and viewed using locally-generated authorization techniques).

Main facility 12 preferably contains a processor to handle information distribution tasks. Each set-top box 34 preferably contains a processor to handle tasks associated with implementing a program guide application on the set-top box 34. User PC equipment contains CPU 44 to handle tasks associated with implementing a program guide application. Television distribution facility 20 may contain a processor for tasks associated with monitoring a user's interactions with the interactive program guides implemented on user PC equipment 28 and user television equipment 26 and for handling tasks associated with the distribution of program guide data and other information to user PC equipment and user television equipment 26. Moreover, the processor of television distribution facility 20 may be used to support the server functions of a client-server program guide.

In user television equipment 26, videocassette recorders 38 allow selected television programs to be recorded. Each videocassette recorder 38 is connected to a respective television 40. To record a program, set-top box 34 tunes to a particular channel and sends control signals to videocassette recorder 38 (e.g., using an infrared transmitter) that direct videocassette recorder 38 to start and stop recording at the appropriate times.

During use of the interactive television program guide implemented on set-top box 34, television program listings and other information may be displayed on television 40. Such program guide displays may be
5 presented as an overlay on top of a television program to which the user has tuned with set-top box 34 or may be presented in place of such a program. Each set-top box 34, videocassette recorder 38, and television 40 may be controlled by one or more remote controls 42 or
10 any other suitable user input interface such as a wireless keyboard, mouse, trackball, dedicated set of buttons, etc. Remote controls such as remote control 42 have various buttons that may be pressed by the user such as arrow keys (for directing on-screen movement of
15 a highlight region, scrolling functions, etc.), an OK, select, enter, or other such selection key for making a selection (hereinafter referred to as an enter key), channel number keys (for selecting a television channel), a favorites key (to invoke functions related
20 to user preferences), a delete key (to delete menu items or to express a disinterest in certain user preferences), etc.

PC equipment, such as PC equipment 28 is based on a CPU 44 that maintains a database 45. A
25 program guide implemented on PC equipment 28 may be used to access and display program guide information on monitor 46. User selections and inputs may be made by a keyboard 48, mouse, trackball, or other PC input devices. It is understood that the following
30 discussion, although directed to user television equipment and set top boxes, is applicable to program guides used in connection with PC equipment.

Modern cable and satellite systems provide users with a wide range of programming, of which only a portion may be of interest to a user at a particular time. In order to locate programs of interest, program 5 listings data is associated with each program. The program guide displays program listings for the user in various display formats. The program guide may allow the user to search for program listings of interest using keywords. For example, each program listing may 10 be associated with one or more programming categories that identify the subject matter of the program. Typical categories, which are also sometimes called themes or genres, include, e.g., sports, news, movies, comedy, children's, adult, etc. As will be described 15 in greater detail below, program listings data may be provided to the main facility 12 from an external data source 18. In the program listings data provided by external data source 18, each program listing may already be associated with one or more categories. 20 Back office processor 14 and transmission system 33 may also perform functions associated with assigning program listings to appropriate programming categories.

Program guides typically display lists of available programming categories, and allow users to 25 search through the program listings data by selecting one or more such categories. In accordance with the present invention, users may search for program listings of interest using both "simple" categories and "combination" categories. A simple category is an 30 individual programming category, such as sports, comedy, horror, news, movies, children, adult, etc. A combination category is a programming category that is

composed of multiple simple categories, such as comedy-movies, comedy-series, sports-baseball, or sports-comedy. Where not specified, the term programming category refers collectively to both simple and
5 combination categories.

In main facility 12, program listings may initially be categorized into simple categories. This may be accomplished, for example, by manual data entry. If desired, program listings data may be received from
10 a data source 18 that already has been categorized in simple categories. An automatic process in back office processor 14 or transmission system 33 may process each program listing with associated simple categories to assign that program listing to appropriate combination
15 categories from among the combination categories supported by the system.

This process is illustrated in greater detail in FIG. 2. As shown in step 60, program listings information is supplied to main facility 12 of FIG. 1
20 from one or more data sources, such as data source 18 of FIG. 1. The program listings information may be composed of programming titles, channels, scheduled broadcast times, program durations (or end times), ratings, critics ratings, descriptions, simple
25 categories, actors, etc. At step 62, each program listing is reviewed and one or more simple categories are assigned to the program listing if necessary. This step may be performed by an operator after reviewing the program listing, a program synopsis or other
30 information. This step may alternatively be automated by assigning categories based on key words appearing in the program description associated with the listing.

SEARCHED SERIALIZED INDEXED

If desired, simple categories may be assigned to the program listings prior to transmission of the program listings data from data source 18 (such that steps 60 and 62 would be combined).

- 5 At step 64, a list of preselected combination categories is retrieved from memory (e.g., memory located in back office processor 14). The list of simple and combination categories that are supported by the program guide are supplied by the main facility 12
10 to the user equipment 26/28, or the program guide server 22, or the web server 29, either with the program guide listings or separately, and stored in memory in advance of step 64. Information on which combination categories (and simple categories) are
15 supported by the system is also provided to the program guides, so that the program guides may present appropriate category selection options to the users. As will be described below with respect to FIG. 2 (step 66) and FIG. 4, the list of supported categories may be
20 used by the program guide to determine which categories to display to the user. The number of simple programming categories may be large due to the diversity of programming available. Therefore, the total number of potential combination categories,
25 composed of every possible pair of simple categories, is even larger and may be unmanageable. Not every possible combination of two simple categories is logical or useful to the user. Therefore, only some of the possible combination categories are preferably
30 supported by the program guide. The selection of supported combination categories by the program guide provider may be based on user interest in the various

combinations. The list of supported combination categories may be derived from high user interest as expressed by a relatively high frequency of selection of the constituent simple categories, for example.

- 5 Step 62 and step 64 are independent of one another. They may be performed concurrently or consecutively. It is also understood that step 64 need only be performed once and the list of supported categories may be accessed in later steps.

10 At step 66, the program listings data for each program, which includes at least the program title and one or more simple programming categories, is reviewed. The simple programming categories associated with a particular program listing are compared with the
15 list of supported combination categories. When two or more simple categories associated with a given program listing are determined to match a supported combination category in the supported combination category list, that combination category is assigned to the given
20 program listing at step 70. Steps 66 and 70 may be performed repeatedly, until each program listing has been reviewed and assigned any relevant combination categories. The above-described combination category build process of steps 60, 62, 64, 66, 68 and 70 may be
25 executed automatically at back office processor 14, at the transmission system 33, or any other such suitable location.

Illustrative data structures of the type that may be used by the program guide system are shown in
30 FIGS. 3(a)-3(c). An illustrative data structure 150 that contains title information 152 for the program The Natural is shown in FIG. 3(a). Several simple

PCT/US2014/033074

programming categories 154 have been assigned to this program listing, i.e., drama, sports, and baseball (e.g., at step 62 of FIG.2). A portion of an illustrative list 156 of supported combination categories 158 is shown in FIG. 3(b). For example, sports-drama, sports-comedy, sports-series, sports-baseball, and sports-football are in the list.

Continuing with this example, other conceivable combination categories, such as drama-baseball are not supported. In steps 66 and 70 of FIG. 2, the simple categories associated with the program listing of FIG. 3(a) are compared with the supported combination category list of FIG. 3(b) until the combination category build process is complete and revised program listings data such as the revised program listings data 160 illustrated in FIG. 3(c) has been produced. At step 66 of FIG. 2, the build process groups simple categories sports and drama, and determines that a combination category which includes sports and drama, i.e., sports-drama, is supported in list 156. Next, the program listing of FIG. 3(a) is assigned the combination category sports-drama at step 70. Steps 66 and 70 may be repeated as necessary until all possible groups of simple categories have been compared with the list 156 of supported combination categories. Thus, the build process notes the categories sports and baseball and assigns the combination category sports-baseball. It is understood that the process described above is exemplary only, and that other procedures for assigning combination categories to programs are contemplated. For example, all simple categories may be combined as combination categories first, and then

unsupported combination categories subsequently deleted.

With continued reference to FIG. 2, program guide displays a selectable list of programming categories at step 72. The list of supported combination categories described above may be used by the program guide to determine which categories to display to the user. The displayed categories may include both simple categories and supported combination categories. The program guide may search the program listings database for program listings in each of the categories. The program guide may then display only those categories having at least one program listing associated with that category, while suppressing categories having no associated program listings. As shown in FIG. 4, category list 172 may be displayed as part of program guide display screen 170. Category list 172 is more useful to the user than category lists that contain only simple categories or those that contain potentially confusing nested hierarchical lists described above. Category list 172 is more detailed than non-hierarchical lists based on simple categories because it is not limited to broad categories. Category list 172 is also simpler to use than program guides that require users to enter multiple categories to initiate a search. Category list 172 retains the simplicity of use of non-hierarchical lists, because the user may intuitively scroll through the list (e.g., with arrow keys on remote control 42 or a suitable on-screen control). Moreover, category list 172 has the advantage of the hierarchical list in that it provides more useful and

specific program categories for the user while avoiding the disadvantage of the hierarchical list's need to perform confusing searches by navigating through nested lists of categories. The user may initiate the display 5 of list 172 using any suitable button or on-screen option provided by the program guide. The display of programming categories may be initially provided to the user by the program guide in alphabetical order. The program guide may display the name of the category 176, 10 i.e., "sports-baseball," by including the simple categories that have been joined, i.e., "sports" and "baseball." Alternatively, the guide may display the name of one of the simple categories, e.g. "baseball," or another appropriate name for the category.

15 The order of the displayed categories may be modified to provide more useful information to the user. Commonly-assigned Rosenthal et al. United States patent application serial no. 09/262,658, filed March 4, 1999 discloses several options for modifying the 20 display of programming categories based on which categories are favorites of the user and is hereby incorporated by reference herein in its entirety. These and other examples of suitable ways in which the program guide may display programming categories in a 25 manner which reflects user interest are described below.

According to a first option, the program guide displays a selectable list of programming categories at step 80 (FIG. 5(a)). FIG. 5(b) displays 30 category list 172 on display screen 170. After the user chooses a favorite programming category 174, e.g., sports, and presses enter on the user remote, the

program guide redisplays the list of programming categories with the selected programming category moved to the top of the list of programming categories at step 84 (FIG. 5(a)). FIG. 5(c) displays favorite 5 programming category 174 redisplayed at the top of category list 172.

A second option is illustrated in FIG. 6. As with the first option, the selectable list of programming categories is displayed by the program 10 guide at step 86. As the user selects various categories and views the associated program listings, the program guide monitors the frequency of selection of each of the programming categories at step 90. The program guide redisplays the list of categories 15 according to the frequency of selection of each programming category at step 92. For example, the programming category selected most frequently may appear at the top of the list. The category having the second highest frequency of access may be displayed 20 second on the list, and so forth.

A third option is illustrated in FIGS. 7(a) and 7(b). The program guide in FIG. 7(a) displays the selectable list of programming categories at step 94. After the user selects a category, the program guide 25 provides the option of designating a particular location or order of placement in the category list 172 at step 96. The list is subsequently redisplayed by the program guide with the selected programming category appearing at the designated location at step 30 98. As illustrated in FIG. 7(b), screen 200, similar to screen 170, above, displays category list 202 wherein each category has an initial ranking, such as

ranking 203. The user may wish to select the category 204, i.e., sports, and designate the second position in the list to be used for that category. Such designation may be made by entering the number "2" in 5 box 206 by using numerical keys or the arrow keys on the user remote. The list is subsequently redisplayed by the program guide with the selected programming category appearing at the designated. Continuing with the example, the programming category sports will 10 appear in the second position on the category list 202 (not shown).

According to a fourth option, the program guide displays a selectable list of programming categories at step 100 of FIG. 8. After the user 15 selects a programming category, the program guide redisplayed the list 172 of programming categories with the selected programming category deleted from the list 172 at step 104. The deleted category may be permanently discarded or may be retained by the program 20 guide in step 106. At step 108, the program guide provides the user with the option of redisplaying the list such that the selected programming category is restored to the list. If the user opts to restore the deleted category to the list, the restored list may be 25 displayed at step 109. The option to retain and restore or delete categories is particularly useful if the user's interests change or if multiple users share the program guide. A programming category that may have been of little interest to the user at one time 30 may subsequently attract greater interest for the user or may be of interest to another one of the users.

PCT/US2014/041989

As shown in FIG. 2, after the program guide displays the selectable list of categories at step 72, the user may select a desired category. As shown in FIG. 4, the program guide may allow the user to use 5 arrow keys on remote control 42 (FIG. 1) to position a highlight region such as highlight region 174 on a particular programming category 176, e.g., "sports-dramas". After the desired category has been highlighted, the user may press enter on remote control 10 42. This directs the program guide to use the selected category (e.g., the category "sports-dramas") as a search criterion for searching the program listings data for programming having the "sports-dramas" combination category. As illustrated in FIG. 2, the 15 program guide searches for program listings data matching the selected category at step 76. The search may be performed in database 36 or 45 by the user equipment 26 or 28, or alternatively, in database 24 at television distribution facility 20 when a client- 20 server architecture is used (FIG. 1). If an on-line program guide configuration is used, the search may be performed by the web server that provides the on-line program listings.

At step 78, the program guide displays the 25 results of the search, i.e., the program listings that match the selected category.

Program listings that match the selected category "sports-drama" are displayed (as an example) in FIG. 9. The program listings displayed in screen 30 300 of FIG. 9 are organized by broadcast time 302 and by channel 304. Cells 306 for program listings that satisfy the search by matching the selected category

00418332-4400-4C9

are displayed, whereas programs which do not satisfy the search are suppressed from view. Channels which have no matching programs may be suppressed from the display. For example, channels 7 and 8 would not be
5 displayed in display screen 300 if they are not broadcasting programming in the "sports-drama" category.

In the example of FIG. 9, only programming that has the category "sports-drama" is displayed.
10 Another approach is shown in FIG. 10. With the approach of FIG. 10, screen 350 is used to display all available program listings to the user organized by broadcast time 352 and by channel 354. Cells 356 containing program listings that satisfy the search may
15 be distinctively displayed to attract the user's attention. For example, each program listing satisfying the search may be represented in a distinctive color. In addition (or alternatively), an icon or label 358, e.g., "sports-drama" may be provided
20 in the program listing cell 356 to indicate a match of that listing with the selected programming category. Thus, all programming is displayed, but only programming having the "sports-drama" category is distinctively displayed.

25 A further example of a program listings by category screen is shown in FIG. 11. The illustrative screen 400 of FIG. 11 includes program listings that match the category sports-drama. It is understood that screen 400 may be used to display program listings for
30 any suitable category. The program listings by category screen of FIG. 11 shows an alternative way in which program listings may be displayed and navigated

through for any display screen in which listings are displayed for multiple time slots. Program listings within list 404 may be displayed in cells 406, and divided into predefined time slots, such as into 30 5 minute time slots. Users may quickly change between time slots by, for example, pressing a "right" or "left" arrows on remote control 42. Between each time slot, separator 410 may be displayed to indicate to a user that a user has scrolled or paged program listings 10 from one time slot to the next. In FIG. 11, for example, a user is scrolling from program listings for sports-drama in the 7:00 PM time slot to program listings for sports-drama in the 7:30 PM time slot. When the user scrolls within listings, highlight region 15 412 may skip separator 410. If desired, separators 410 may be displayed only for those time slots for which there are listings. For example, if there were no sports-drama programs starting at 7:30 PM, that separator would not be displayed. If desired, there 20 may be a "watch previews" selectable feature that users may select to view a preview for a highlighted listing. Users may also view additional information for a listing by, for example, highlighting the listing and pressing an "info" key on remote control 42.

25 In the program listings screens of FIG. 11, program listings may be displayed within each time slot sorted in any suitable manner. Listings may be displayed, for example, by title, channel, start time, or using any other suitable approach. The program 30 listings screen of FIG. 11 has also been shown as including various other screen elements. Program listings display screens may include, for example,

004460 604460 604460 604460

selectable advertisements, advertisement banners, brand logos, service provider logos, clocks, message indicators, arrow indicators 420, or any other suitable screen element. (It is understood that such elements 5 may also be displayed on screens illustrated in FIGS. 9-10, above.) In the illustrative program listings screen of FIG. 11, the program guide may also adjust the time displayed in timebar 422 as the user scrolls or pages through program listings to reflect the time 10 of the program listing at the top of the list.

Regardless of the techniques used to display the search results, the program guide preferably allows the user to navigate through the program listings and select a desired listing (e.g., by positioning a 15 highlight region such as highlight region 360 (FIG. 9), 362 (FIG. 10), or 412 (FIG. 11)). When the user selects a given program listing from the search results, the program guide may take various actions, depending on the type of program listing that was 20 selected. For example, if a program for the selected listing is currently being broadcast, the program guide may provide the user with an option to tune to that program. If the program for the selected listing is scheduled to be broadcast in the future, the program 25 guide may ask if the user wishes to set a reminder for the program. The program guide may also provide the user with an opportunity to direct the guide to record the program or to purchase the program if the program is a pay-per-view event. These various post-search- 30 result features are well known. If desired, the user may simply scroll through the program listings to review which programs are available. Further examples

of searching and displaying programming categories are described in U.S. application 09/262,658, incorporated by reference above.

When a user selects a listing, such as
5 360/362/412 described above, the program guide may display an interactive information display screen such as interactive information display screen 500 of FIG. 12 (which is substantially identical to a portion of FIG. 4a of David M. Rudnick et al. U.S. Patent
10 application Serial No. 09/356,268, entitled PROGRAM GUIDE WITH INTERACTIVE INFORMATION DISPLAY SCREEN, filed July 16, 1999, and incorporated by reference in its entirety herein). Interactive information display screen 500 may include detailed information portion 510
15 and may include a set of user-selectable options 512.

The content of interactive information display screen 500 may depend on the type of program selected. For example, detailed information portion 510 may include several lines of text providing
20 information appropriate for display for a program which may include, for example, a list of all simple categories and combination categories associated with the program, etc. User-selectable options 512, for example, in a menu, may include options that may depend
25 on which type of program is selected and the information associated with the selected item.

The foregoing is merely illustrative of the principles of this invention and various modifications can be made by those skilled in the art without
30 departing from the scope and spirit of the invention.

What is Claimed is:

1. An interactive television program guide system in which an interactive television program guide is at least partially implemented on user equipment of a user, comprising:

means for supplying program listings to the interactive television program guide;

means for supplying information on certain simple categories of programming and certain combination categories of programming that are associated with the program listings;

means for displaying a selectable list of the simple categories and combination categories on the user equipment with the interactive television program guide; and

means for searching for program listings with the interactive television program guide that match a given category selected from the selectable list by the user and displaying the matching program listings with the interactive television program guide on the user equipment.

2. The interactive television program guide system defined in claim 1 further comprising:

a main facility at which the program listings are assigned certain ones of the combination categories each of which is composed of certain ones of the simple categories using a combination category build process in which a number of simple categories associated with each program listing are compared to a list of supported combination categories and a given

combination category is assigned to each program listing when the simple categories associated with that program listing match the simple categories from which the given combination category is composed.

3. The interactive television program guide system defined in claim 1, further comprising:

means for supplying a list of supported combination categories, wherein the means for displaying a selectable list of the simple categories and combination categories comprises means for displaying the categories based on the list of supported combination categories.

4. The interactive television program guide system defined in claim 1 wherein the means for searching for program listings and displaying the matching program listings further comprises means for displaying the matching program listings in a display that only contains matching program listings.

5. The interactive television program guide system defined in claim 1 wherein the means for searching for program listings and displaying the matching program listings further comprises means for distinctively displaying the matching program listings in a display that contains matching and nonmatching program listings.

6. The interactive television program guide system defined in claim 5 wherein the means for distinctively displaying further comprises means for

DEUTSCHE PATENT- UND MARKESSAMMLUNG

displaying the matching program listings in a distinctive color.

7. The interactive television program guide system defined in claim 5 wherein the means for distinctively displaying further comprises means for displaying the matching program listings with distinctive labels.

8. The interactive television program guide system defined in claim 1 further comprising means for allowing the user to rearrange the selectable list.

9. The interactive television program guide system defined in claim 1 further comprising means for allowing the user to rearrange the selectable list by providing an option for the user to select a given programming category and to designate an order of placement on the selectable list for that given programming category and by redisplaying the selectable list with the selected given programming category in the designated order.

10. The interactive television program guide system defined in claim 1 further comprising means for allowing the user to rearrange the selectable list by providing an option for the user to delete a given programming category and by redisplaying the selectable list with the given programming category deleted.

11. The interactive television program guide system defined in claim 1 further comprising means for

GOVERNMENT PROPERTY

allowing the user to rearrange the selectable list by providing an option for the user to select a given programing category and by redisplaying the selectable list with the given programming category reordered to the top of the selectable list.

12. The interactive television program guide system defined in claim 1 further comprising means for automatically rearranging the selectable list with the program guide based on how frequently the user selects certain categories from the selectable list.

13. The interactive television program guide system defined in claim 1 further comprising means for allowing the user to designate certain categories as favorites.

14. The interactive television program guide system defined in claim 13 further comprising means for displaying the selectable list of categories based on the selected favorite categories.

15. The interactive television program guide system defined in claim 1 wherein the user equipment is personal computer equipment.

16. The interactive television program guide system defined in claim 1 wherein the user equipment is user television equipment.

17. The interactive television program guide system defined in claim 1 further comprising:

a television distribution facility connected to the user equipment for providing the program listings and television programming to the user equipment.

18. The interactive television program guide system defined in claim 1 wherein the program listings are provided to the user equipment over the Internet.

19. The interactive television program guide system defined in claim 1 wherein at least one of the simple categories is selected from the group consisting of sports, comedy, news, children's programming, movies, and adult programming.

20. The interactive television program guide system defined in claim 1 wherein at least one of the combination categories is selected from the group consisting of sports-comedy, sports-baseball, comedy-movies, comedy-series, and horror-movies.

21. The interactive television program guide system defined in claim 1, wherein each one of categories in the selectable list of the simple categories and combination categories has at least one program listing associated with the category.

~~22.~~ An interactive television program guide system comprising:

an interactive television program guide at least partially implemented on user television equipment of a user configured to display a selectable

list of certain simple categories of programming and certain combination categories of programming that are associated with program listings on the user equipment, to search for program listings that match a given category selected from the selectable list by the user, and to display the matching program listings with the interactive television program guide on the user equipment; and

distribution equipment configured to supply the program listings to the interactive television program guide and to supply the information on the simple categories and the combination categories of programming.

23. The interactive television program guide system defined in claim 22 further comprising:

a main facility at which the program listings are assigned certain ones of the combination categories each of which is composed of certain ones of the simple categories using a combination category build process in which a number of simple categories associated with each program listing are compared to a list of supported combination categories and a given combination category is assigned to each program listing when the simple categories associated with that program listing match the simple categories from which the given combination category is composed.

24. The interactive television program guide system defined in claim 22, further comprising:

a main facility that supplies a list of supported combination categories, wherein the

interactive television program guide is configured to display the categories based on the list of supported combination categories.

25. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to display the matching program listings in a display that only contains matching program listings.

26. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to distinctively display the matching program listings in a display that contains matching and nonmatching program listings.

27. The interactive television program guide system defined in claim 26 wherein the interactive television program guide is configured to display the matching program listings in a distinctive color.

28. The interactive television program guide system defined in claim 26 wherein the interactive television program guide is configured to display the matching program listings with distinctive labels.

29. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to allow the user to rearrange the selectable list.

DETAILED DESCRIPTION

30. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to allow the user to rearrange the selectable list by providing an option for the user to select a given programming category and to designate an order of placement on the selectable list for that given programming category and by redisplaying the selectable list with the selected given programming category in the designated order.

31. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to allow the user to rearrange the selectable list by providing an option for the user to delete a given programming category and by redisplaying the selectable list with the given programming category deleted.

32. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to allow the user to rearrange the selectable list by providing an option for the user to select a given programming category and by redisplaying the selectable list with the given programming category reordered to the top of the selectable list.

33. The interactive television program guide system defined in claim 22 wherein the interactive television program guide is configured to automatically rearrange the selectable list with the program guide

20100629154247

based on how frequently the user selects certain categories from the selectable list.

34. The interactive television program guide system defined in claim 22 wherein interactive television program guide is configured to allow the user to designate certain categories as favorites.

35. The interactive television program guide system defined in claim 31 further wherein the interactive television program guide is configured to display the selectable list of categories based on the selected favorite categories.

36. The interactive television program guide system defined in claim 22 wherein the user equipment is personal computer equipment.

37. The interactive television program guide system defined in claim 22 wherein the user equipment is user television equipment.

38. The interactive television program guide system defined in claim 22 further comprising:

a television distribution facility connected to the user equipment for providing the program listings and television programming to the user equipment.

39. The interactive television program guide system defined in claim 22 wherein the program listings are provided to the user equipment over the Internet.

40. The interactive television program guide system defined in claim 22 wherein at least one of the simple categories is selected from the group consisting of sports, comedy, news, children's programming, movies, and adult programming.

41. The interactive television program guide system defined in claim 22 wherein at least one of the combination categories is selected from the group consisting of sports-comedy, sports-baseball, comedy-movies, comedy-series, and horror-movies.

42. The interactive television program guide system defined in claim 22, wherein each one of categories in the selectable list of the simple categories and combination categories has at least one program listing associated with the category.

43. A method for using an interactive television program guide system in which an interactive television program guide is at least partially implemented on user equipment of a user, comprising:

supplying program listings to the interactive television program guide;

supplying information on certain simple categories of programming and certain combination categories of programming that are associated with the program listings;

displaying a selectable list of the simple categories and combination categories on the user equipment with the interactive television program guide; and

searching for program listings with the interactive television program guide that match a given category selected from the selectable list by the user and displaying the matching program listings with the interactive television program guide on the user equipment.

44. The method defined in claim 43 further comprising:

assigning to the program listings certain ones of the combination categories each of which is composed of certain ones of the simple categories using a combination category build process in which a number of simple categories associated with each program listing are compared to a list of supported combination categories and a given combination category is assigned to each program listing when the simple categories associated with that program listing match the simple categories from which the given combination category is composed.

45. The method defined in claim 43, further comprising:

supplying a list of supported combination categories, wherein the displaying the selectable list of the simple categories and combination categories comprises displaying the categories based on the list of supported combination categories.

46. The method defined in claim 43 wherein searching for program listings and displaying the

SEARCHED
INDEXED
SERIALIZED
FILED

matching program listings further comprises displaying the matching program listings in a display that only contains matching program listings.

47. The method defined in claim 43 wherein searching for program listings and displaying the matching program listings further comprises distinctively displaying the matching program listings in a display that contains matching and nonmatching program listings.

48. The method defined in claim 42 wherein distinctively displaying further comprises displaying the matching program listings in a distinctive color.

49. The method defined in claim 42 wherein distinctively displaying further comprises displaying the matching program listings with distinctive labels.

50. The method defined in claim 43 further comprising:

allowing the user to rearrange the selectable list.

51. The method defined in claim 43 further comprising:

allowing the user to rearrange the selectable list by providing an option for the user to select a given programming category and to designate an order of placement on the selectable list for that given programming category and by redisplaying the

selectable list with the selected given programming category in the designated order.

52. The method defined in claim 43 further comprising:

allowing the user to rearrange the selectable list by providing an option for the user to delete a given programming category and by redisplaying the selectable list with the given programming category deleted.

53. The method defined in claim 43 further comprising:

allowing the user to rearrange the selectable list by providing an option for the user to select a given programing category and by redisplaying the selectable list with the given programming category reordered to the top of the selectable list.

54. The method defined in claim 43 further comprising:

automatically rearranging the selectable list with the program guide based on how frequently the user selects certain categories from the selectable list.

55. The method defined in claim 43 further comprising:

allowing the user to designate certain categories as favorites.

56. The method defined in claim 55 further comprising:

displaying the selectable list of categories based on the selected favorite categories.

57. The method defined in claim 43 further comprising:

providing a television distribution facility connected to the user equipment for providing the program listings and television programming to the user equipment.

58. The method defined in claim 43 further comprising:

providing the program listings to the user equipment over the Internet.

59. The method defined in claim 43 further comprising:

selecting at least one of the simple categories from the group consisting of sports, comedy, news, children's programming, movies, and adult programming.

60. The method defined in claim 43 further comprising:

selecting at least one of the combination categories is selected from the group consisting of sports-comedy, sports-baseball, comedy-movies, comedy-series, and horror-movies.

61. The method defined in claim 43, wherein
the displaying the selectable list of the simple
categories and combination categories comprises
displaying each of one of the categories having at
least one program listing associated with the category.

Abstract of the Disclosure

An interactive television program guide system is provided in which the program guide may provide the user with a selectable list of combination categories. Combination categories are composed of multiple simple categories such as sports, news, comedy, movies, children, etc. Program listings are supplied to the program guide. At least some of the program listings are associated with combination categories. A combination category build process may be used to assign combination categories to program listings. The user is able to use the selectable categories list to quickly identify programming of interest.

PRINTED IN U.S.A. 1993

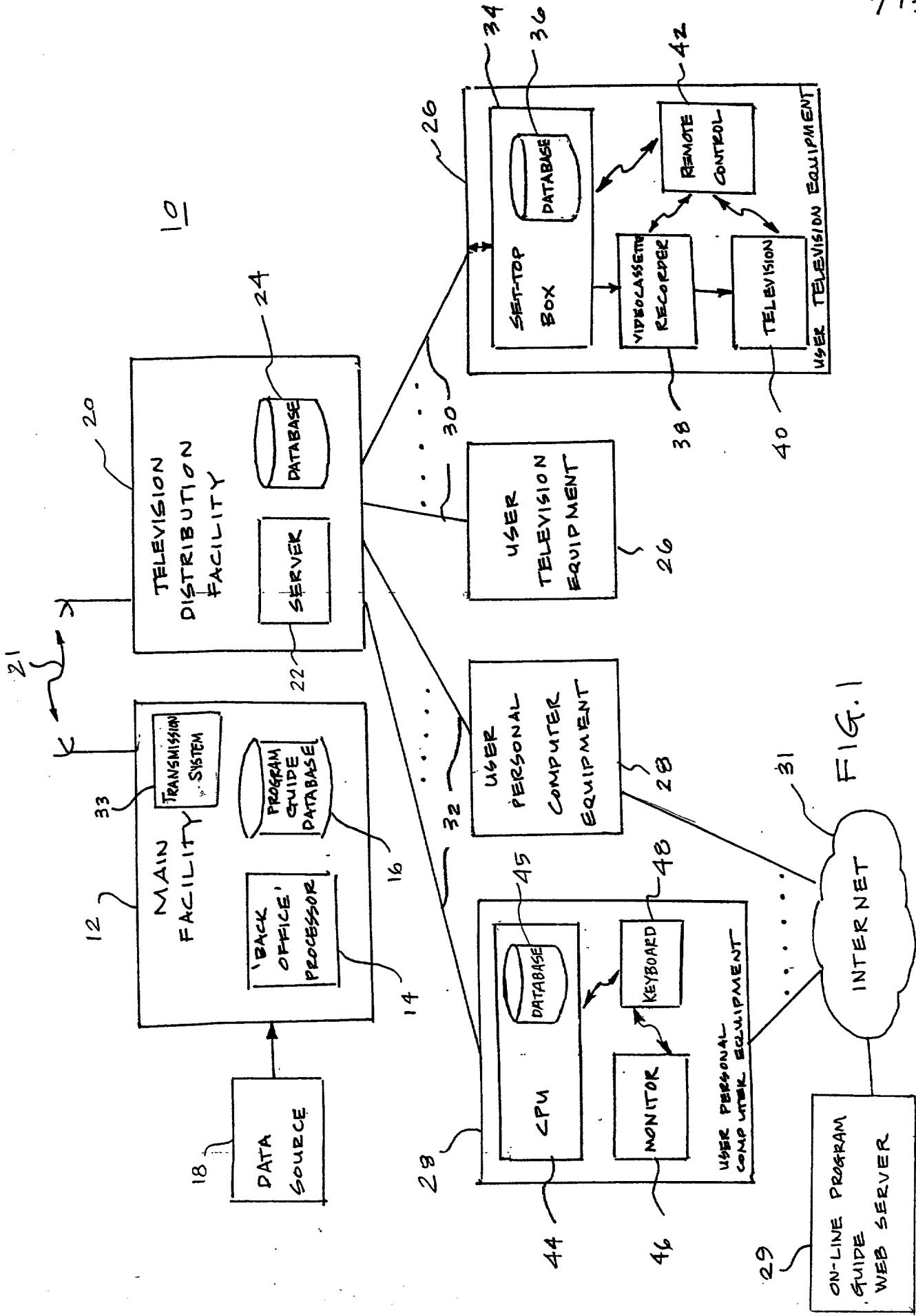


FIG. 1

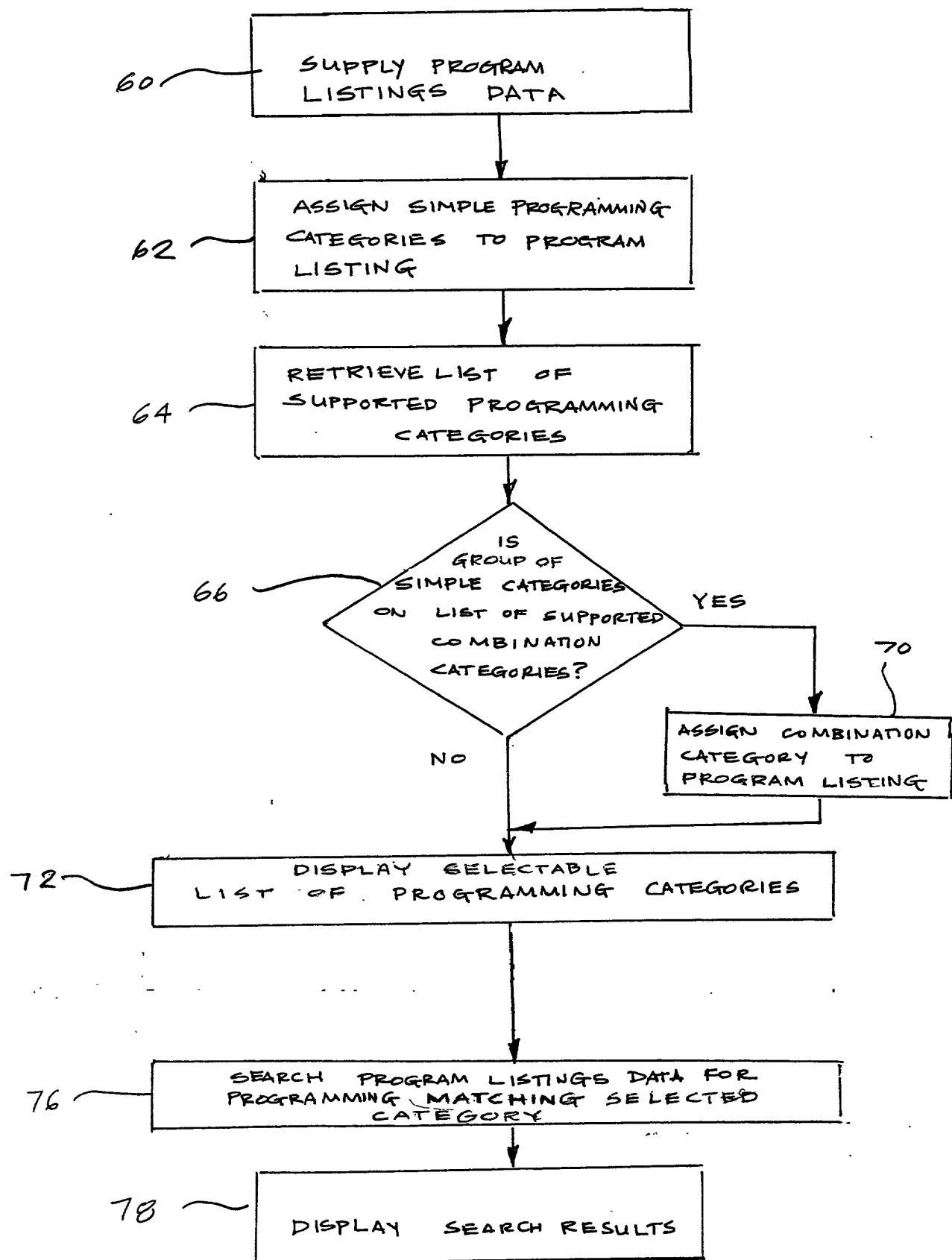


FIG. 2

3/13

150

PROGRAM LISTING

TITLE
152 THE NATURAL

CATEGORIES

154 DRAMA
SPORTS
BASEBALL

FIG. 3(a)

156

**SUPPORTED
COMBINATION
CATEGORIES**

⋮

SPORTS - BASEBALL
SPORTS - COMEDY
SPORTS - DRAMA
SPORTS - FOOTBALL
SPORTS - SERIES

⋮
⋮
⋮

150

PROGRAM LISTING

TITLE
THE NATURAL

CATEGORIES

DRAMA
SPORTS
BASEBALL
SPORTS - DRAMA
SPORTS - BASEBALL

FIG. 3(b)

FIG. 3(c)

UV - III
4/13

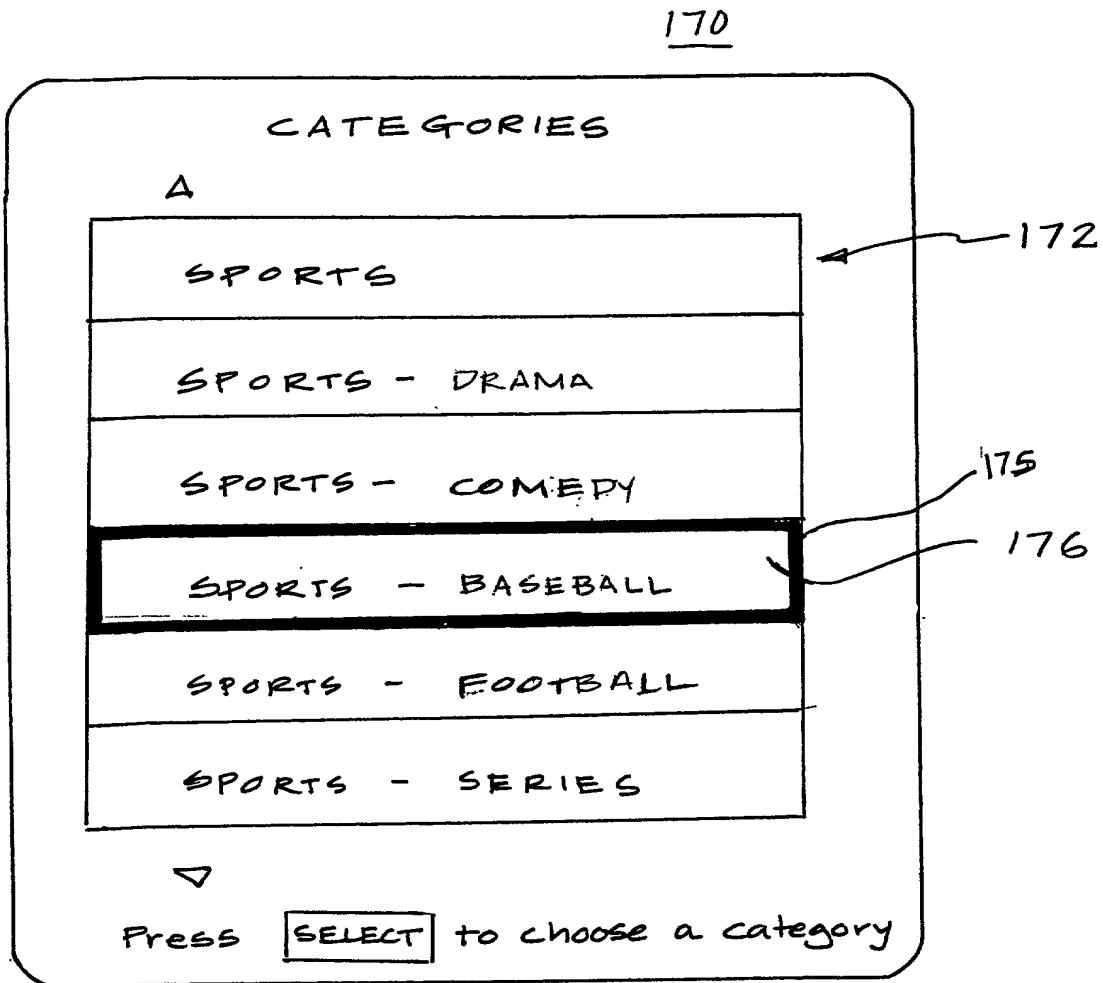


FIG. 4

UV-111
5/13

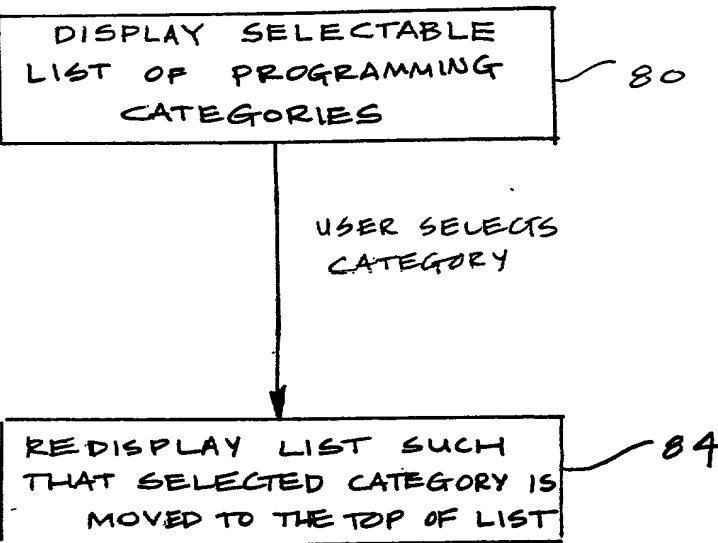


FIG. 5(a)

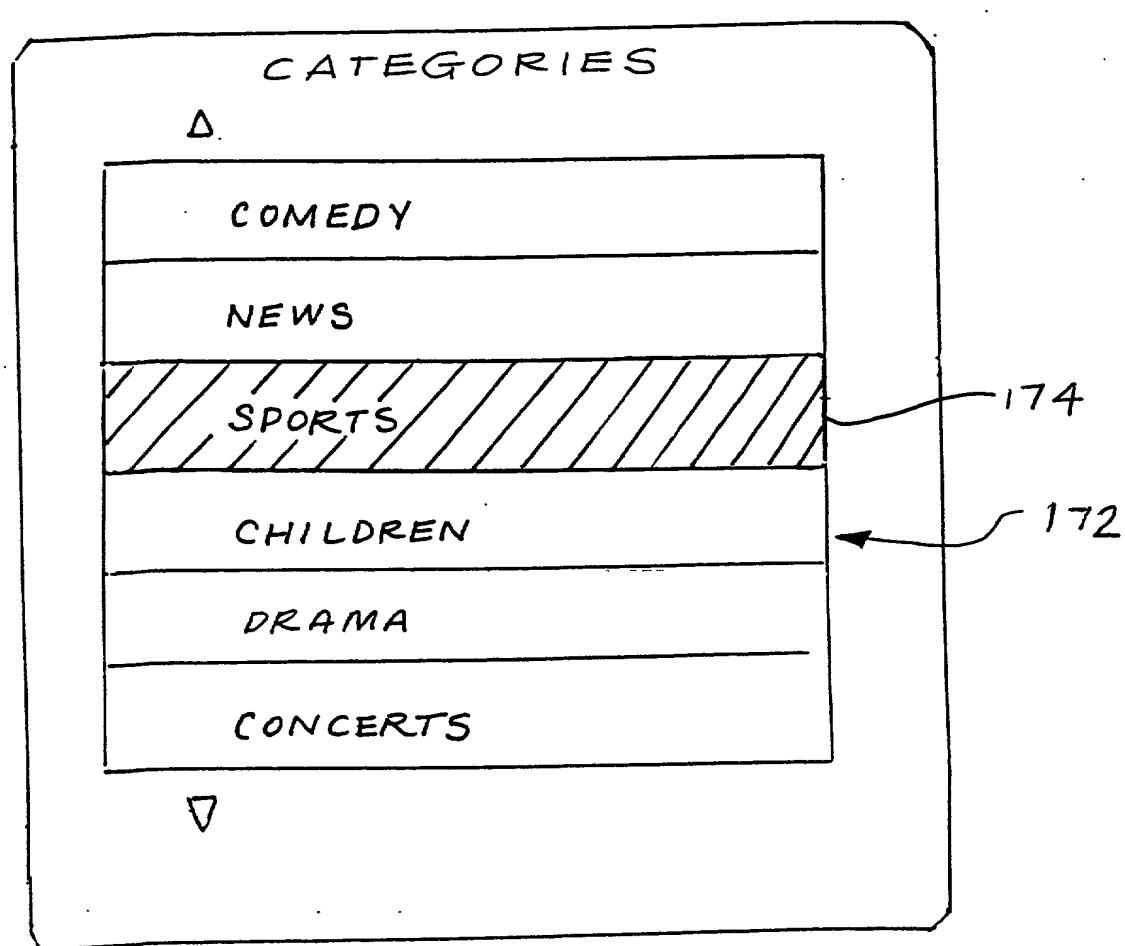


FIG. 5(b)

UV-111
6/13

170

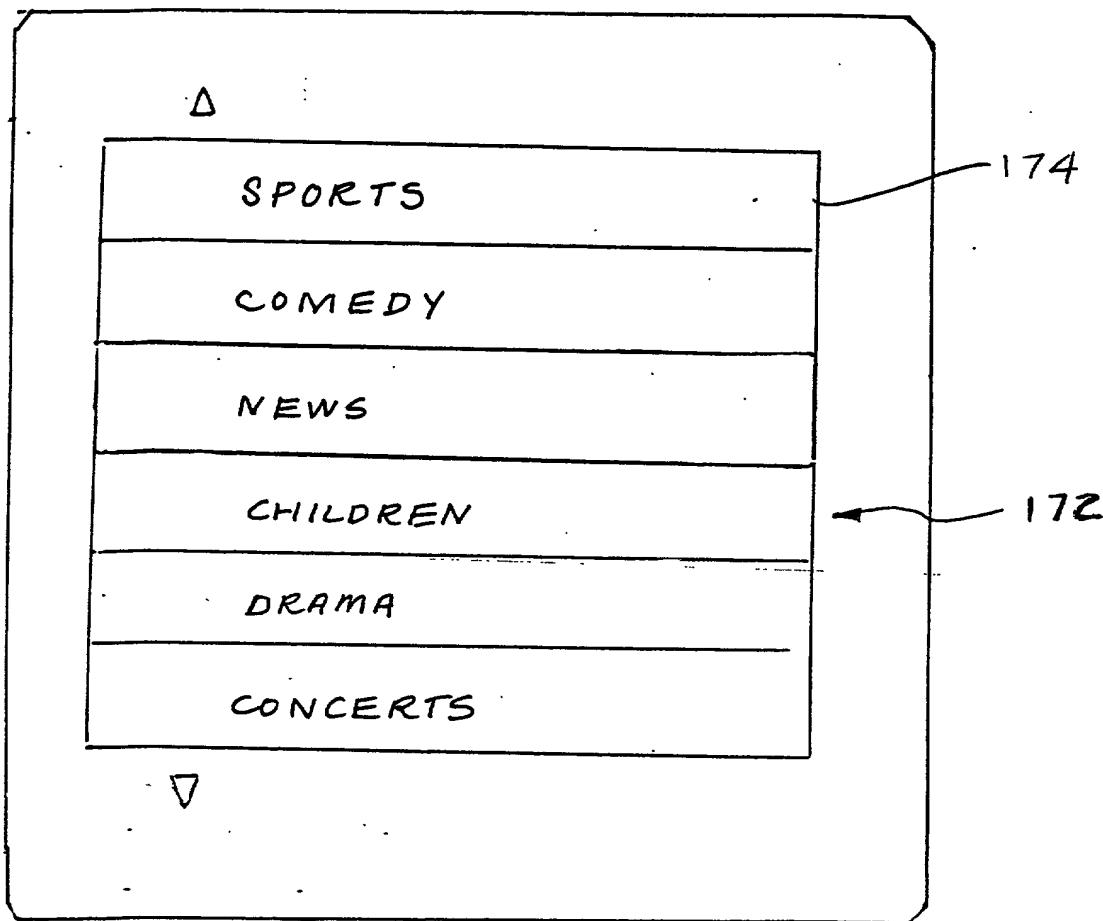
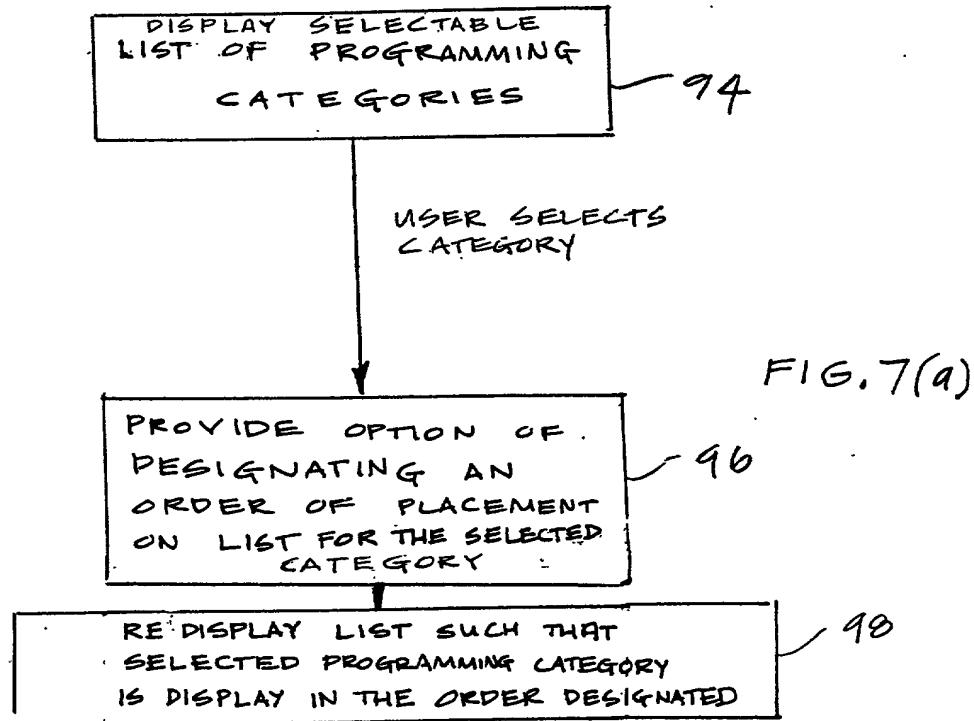
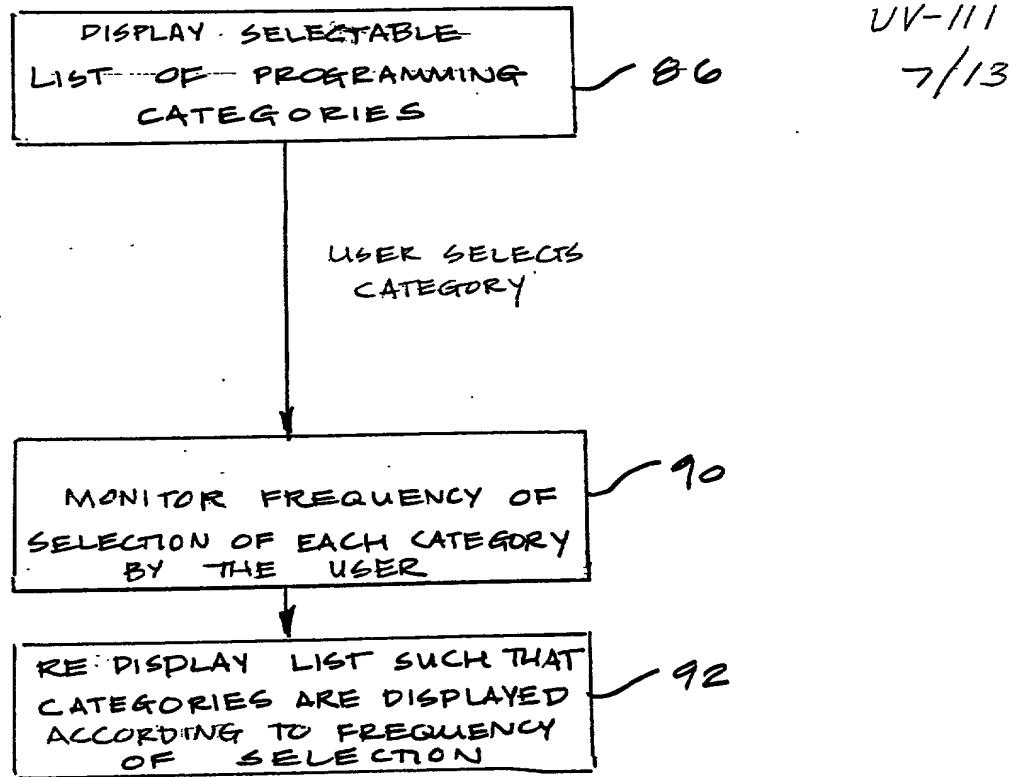


FIG. 5(c)



UV-111
8/13

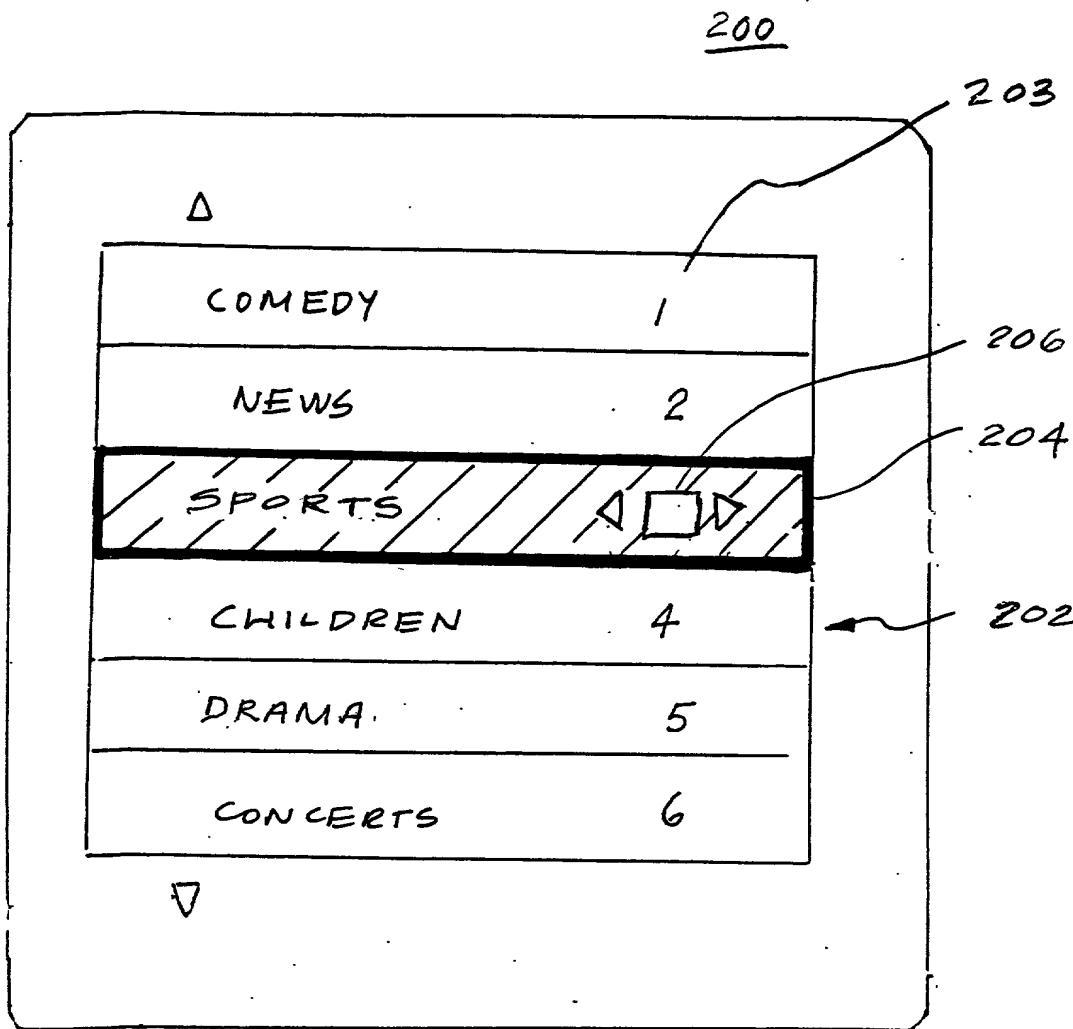


FIG. 7(b)

UV-111
9/13

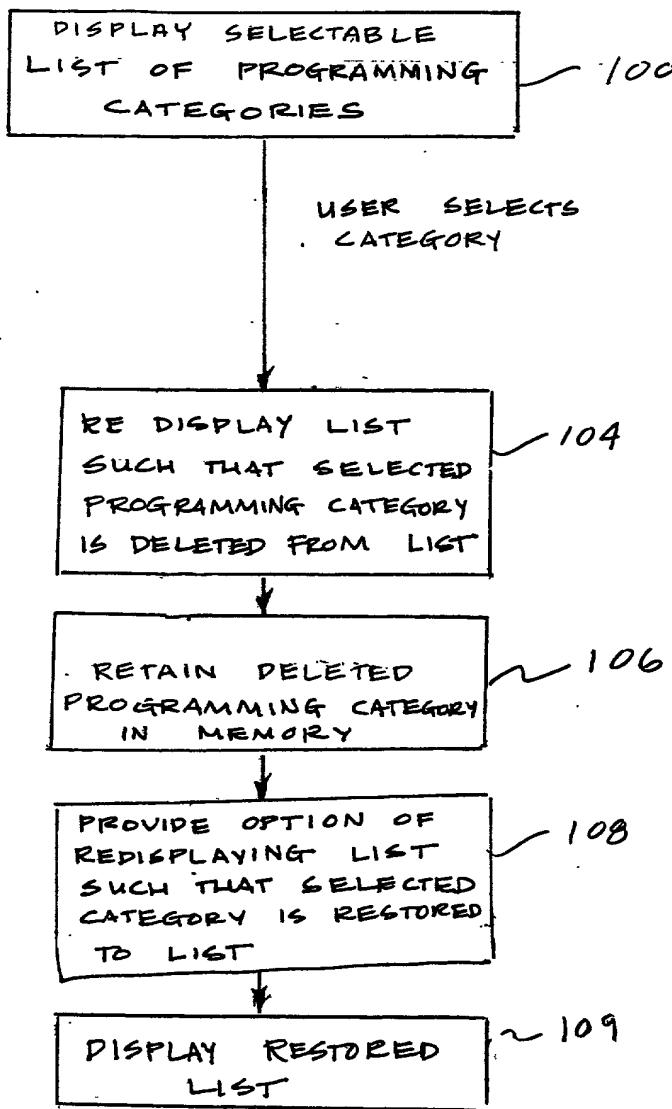


FIG. 8

UV-111

10/13

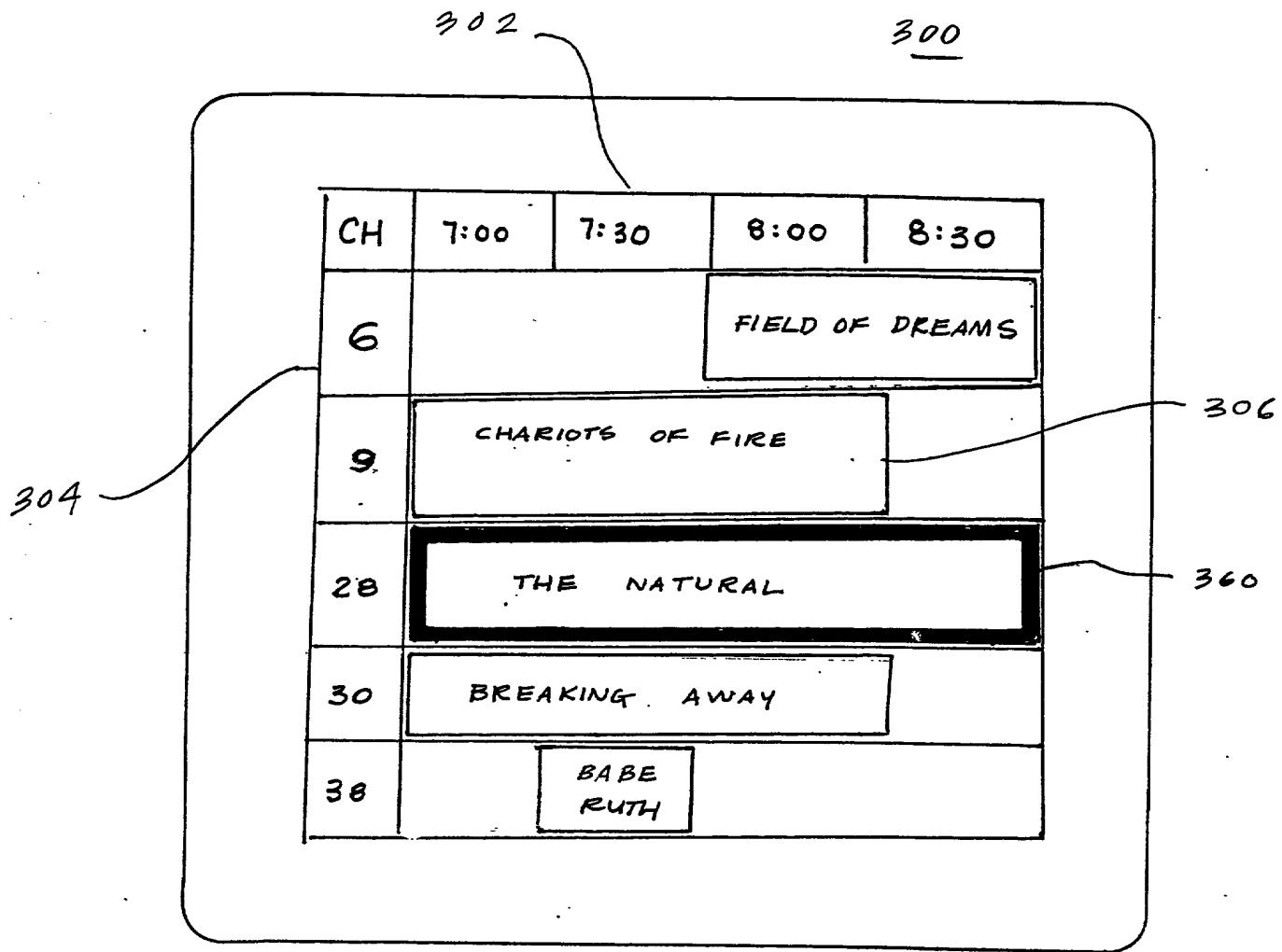


FIG. 9

UV-111

11/13

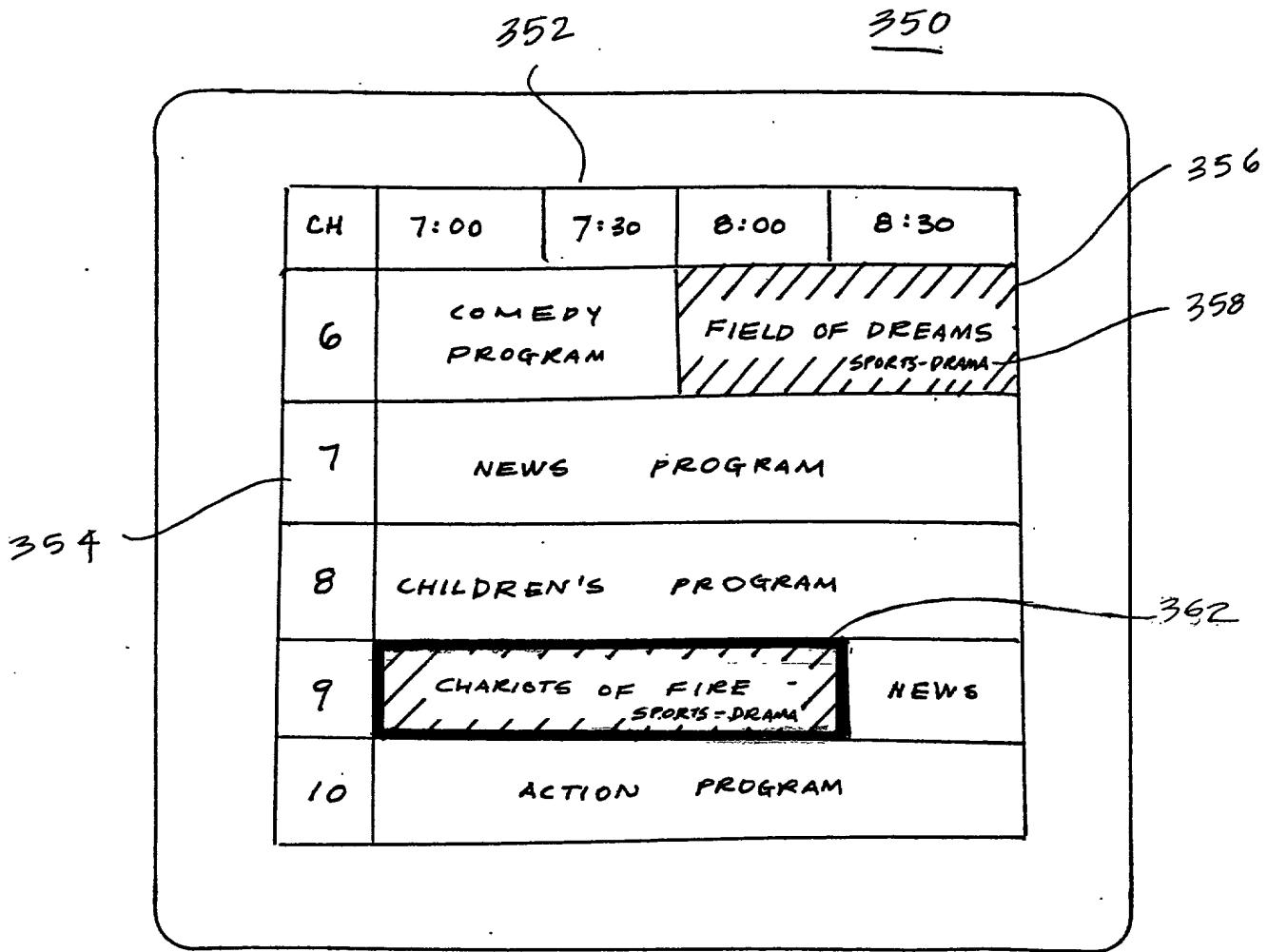


FIG. 10

UV-111

12/13

400

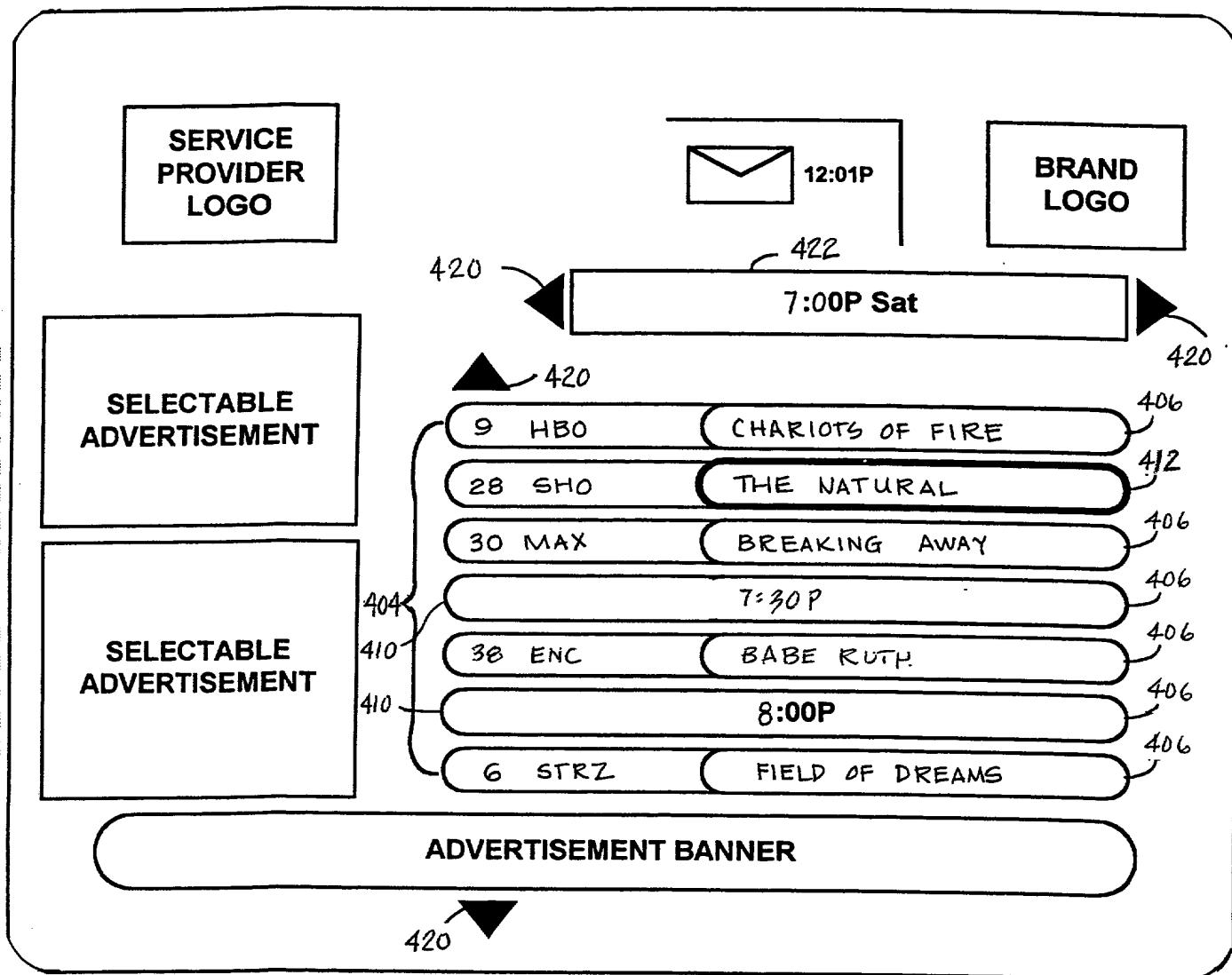


FIG. 11

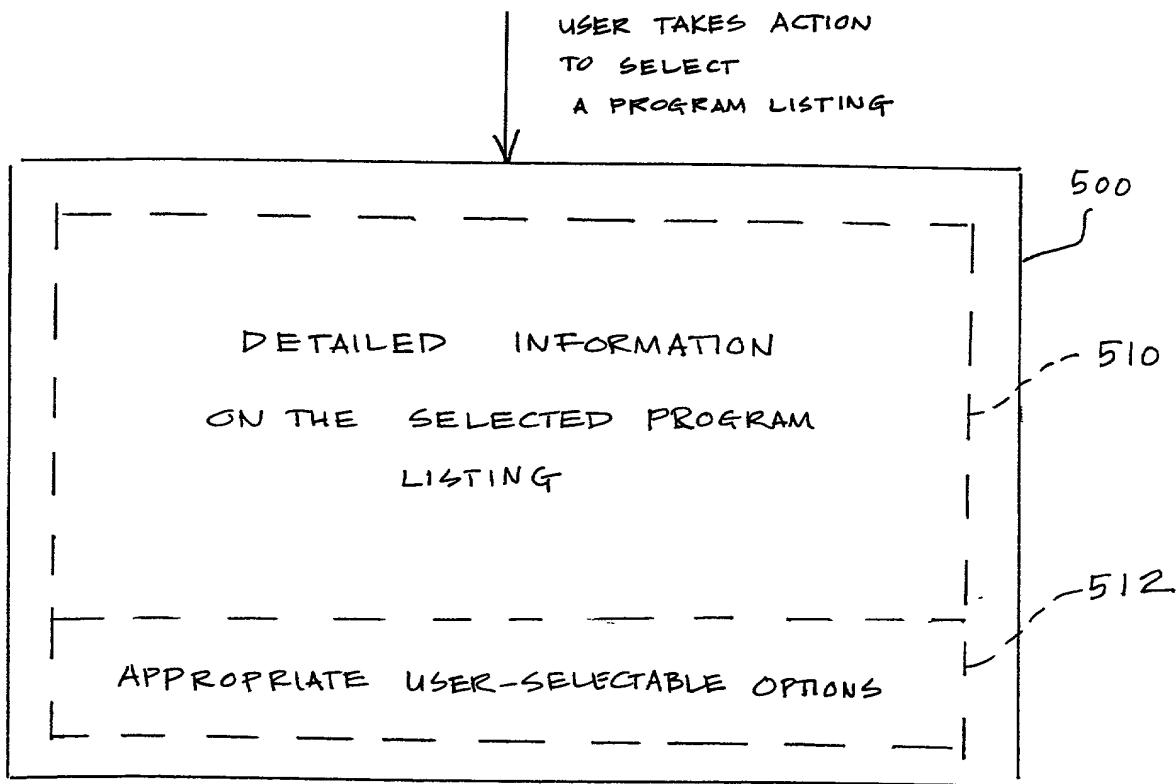


FIG-13

UV-111

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe I am an original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

PROGRAM GUIDE SYSTEM WITH
COMBINATION CATEGORY SEARCH

the specification of which

[X] is attached hereto

[] was filed on _____ as Application
Serial No. _____.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I do not know and do not believe that the invention was ever patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application.

I do not know and do not believe that the invention was in public use or on sale in the United States of America more than one year prior to this application.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known by me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

<u>(Number)</u>	<u>(Country)</u>	<u>(Filing Date)</u>	<u>[]</u>	<u>[]</u>	<u>Priority Claimed</u>
			Yes	No	

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

60/106,855 November 3, 1998
(Application Serial No.) (Filing Date)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known by me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

<u>(Application Serial No.)</u>	<u>(Filing Date)</u>	<u>(Status) (patented, pending, abandoned)</u>
-------------------------------------	----------------------	--

As a named inventor, I hereby appoint the following attorneys or agents to prosecute this application and transact all business in the United States Patent and Trademark Office connected therewith:

Robert C. Morgan, Reg. No. 30,199
G. Victor Treyz, Reg. No. 36,294
Walter M. Egbert III, Reg. No. 37,317

Send correspondence to: Walter M. Egbert III
FISH & NEAVE
1251 Avenue of the Americas
New York, New York 10020-1104

Direct telephone calls to: Walter M. Egbert III
(212) 596-9000

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

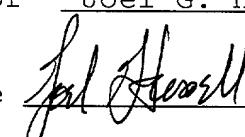
Full name of first inventor Edward B. Knudson

First inventor's signature  9-21-99
Date

Residence 1105 West Rowland Avenue, Littleton, Colorado
80127

Citizenship United States
Post Office Address 1105 West Rowland Avenue,
Littleton, Colorado 80127

Full name of second inventor Joel G. Hassell

Second inventor's signature  9/20/99
Date

Residence 8246 Yarrow Court, Arvada, Colorado 80005

Citizenship United States
Post Office Address 8246 Yarrow Court, Arvada, Colorado
80005

- 4 -

Full name of third inventor Michael D. Ellis

Third inventor's signature Michael 9/26/99
Date

Residence 1300 Kingwood Place, Boulder, Colorado 80304

Citizenship United States

Post Office Address 1300 Kingwood Place, Boulder,
Colorado 80304

Full name of fourth inventor William L. Thomas

Fourth inventor's signature William L. Thomas 9/26/99
Date

Residence 11611 South 70th East Avenue, Bixby, Oklahoma
74008

Citizenship United States

Post Office Address 11611 South 70th East Avenue,
Bixby, Oklahoma 74008